

# Appendix C Ultra ATA Devices



**NOTE** This system supports a mixed configuration of UATA/IDE, SCSI, and SATA hard drives. While HP supports the presence of IDE drives, it does not ship any configurations using those drives.

## Ultra ATA Jumpers

Ultra ATA drives are configured with jumper settings. Factory-installed drives ship with the jumpers preset to the cable-select mode; therefore, no jumper setting changes are required on factory preinstalled, replacement, or option drives. With cable-select, the drive is configured as either Master (Drive/Device 0) or Slave (Drive/Device 1) by its physical attachment to the cable.

If you purchase a third-party hard drive, refer to the documentation included with the drive kit to ensure proper cable installation and configuration.



**NOTE** All drives on a controller channel must have their jumpers either in the cable-select mode or have the individual drive jumper installed on the appropriate Master (Drive/Device 0) or Slave (Drive/Device 1) position.

## Ultra ATA Cables

When installing a second device on either the primary or secondary controller, you must use an industry standard 80-conductor Ultra ATA cable for optimal performance. These cables have a maximum length of 18 inches and a maximum distance of six inches between the two devices for a two-drive cable.

Drives operating at speeds faster than those of the Ultra ATA-33 devices require industry-standard 40-pin, 80-conductor cables to maintain the higher data transfer rates possible with the improved technology.

When using Ultra ATA-133, -100, -66, and slower -33 drives in the same system, each drive will operate at its appropriate data transfer rate.

## Drive Installation Guidelines

Most workstation system boards have two ATA (IDE) controller channels with a dedicated connector for each controller. One controller is designated as the primary and the other as the secondary controller.

Each of the two controllers can have up to two devices attached to it. Each workstation system might therefore have a maximum of four ATA/ATAPI drives. All drives are connected to these controllers using an industry-standard, 80-conductor cable.



**NOTE** The industry standard, 1.44-MB diskette drive has its own separate channel and is not included as a part of the maximum four drives.

Any drive attached to a controller must have a drive designation. If only a single drive is connected to a controller and its jumper is in the cable-select position, it is designated as the Master Drive (Drive/Device 0) by its attachment to the Drive/Device 0 cable position. If two cable-selected drives are connected to a single controller, one will be designated by its attachment to the cable as the Master (Drive/Device 0) and the other as Slave (Drive/Device 1).

For optimal performance of a workstation system, all drives must be attached to the ATA controllers in a specified sequence. This sequence is determined by the device class of the drives and by specific attach sequence rules.

## Device Classes

To determine the best drive attach sequence, ATA/ATAPI drives are segregated into four different classes based on the bandwidth demands they place on an ATA controller. The most demanding devices are in Class 1 and the least demanding are in Class 4.

**Table C-1** Device Classes

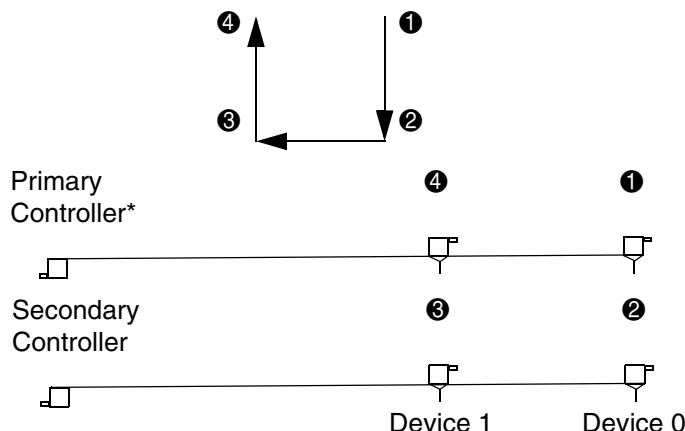
| Class 1<br>Hard<br>Drives   | Class 2 High Speed<br>Optical Drives | Class 3 Optical Storage<br>Drives | Class 4<br>Magnetic Storage Drives |
|-----------------------------|--------------------------------------|-----------------------------------|------------------------------------|
| ATA-100<br>ATA-66<br>ATA-33 | DVD<br>DVD-CD R/W                    | R/W CD-ROM<br>CD-ROM              | LS-120<br>Tape<br>Zip              |

## General Attach Guidelines

- The lower the device class number, the faster the device and the more bandwidth required.
- Drives installed in the Device 0 positions on both the primary and secondary controllers receive the greatest possible bandwidth.
- The bootable ATA hard drive should always be installed on the primary controller in the Device 0 position.

## Attach Sequence Rules by Class Priority

Drives should be attached in the sequence shown for optimum performance starting at position ①.



**Figure C-1** Installing Drive Order

\*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The attach sequence rule can also be stated in table format:

**Table C-2** General Attach Sequence Rule\*

| Sequence | Description  |
|----------|--|
| 1        | The lowest class drive—bootable hard drive recommended.  |
| 2        | If only two drives, the last drive goes here; otherwise, the lowest class of the remaining drives.               |
| 3        | If only three drives, attach the final drive here. If a fourth drive exists, attach the lowest class drive here. |
| 4        | If there is a fourth drive, attach the final drive here—the drive with the highest class number of all devices.  |

\*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

The rules allow for:

- Keeping the hard drive on a separate controller channel maximizes drive performance until a fourth device is added.
- Keeping the hard drives and removable media drives on separate controller channels maximizes compatibility.
- Keeping the hard drive and the writable optical drive on separate controller channels maximizes optical drive reliability.

### Attach Sequence Worksheet

Use the worksheet below for obtaining optimum system performance when setting up a workstation with multiple drives. Use the General Attach Sequence Rule to determine the best drive installation sequence.

**Table C-3** Attach Sequence Worksheet

| Device Name | Device Class | Position Number | Controller Name | Device Number |
|-------------|--------------|-----------------|-----------------|---------------|
|             |              |                 |                 |               |
|             |              |                 |                 |               |
|             |              |                 |                 |               |
|             |              |                 |                 |               |

Two examples of how to use the worksheet are:

- Three device installation
- Four device installation

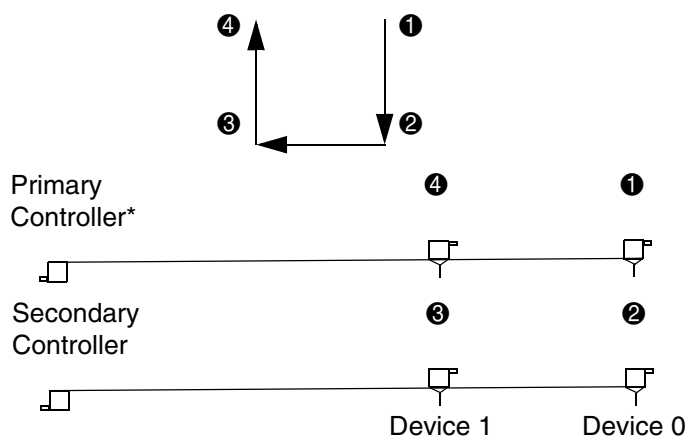
#### Example 1: Three Device Installation Sample

A system has three devices: Ultra ATA-100 hard drive, CD-ROM drive, and a DVD drive. Using the Device Class Table, the devices can be identified as:

- Ultra ATA-100 hard drive = Class 1
- DVD drive = Class 2
- CD-ROM drive = Class 3

**Table C-4** Attach Sequence Worksheet—Three Device Installation (Sample)

| Device Name              | Device Class | Position Number | Controller Name | Device Number |
|--------------------------|--------------|-----------------|-----------------|---------------|
| Ultra ATA-100 hard drive | 1            | ①               | Primary         | 0             |
| DVD drive                | 2            | ②               | Secondary       | 0             |
| CD-ROM drive             | 3            | ③               | Secondary       | 1             |



*Figure C-2 Installing Drive Order (2)*

## Example 2: Four Device Installation Sample

A system has four devices: Ultra ATA-100 hard drive, Ultra ATA-100 hard drive, DVD-CDR/W drive, and a ZIP-250 drive.

- Ultra ATA-100 hard drive = Class 1
- Ultra ATA-100 hard drive = Class 1
- DVD-CDR/W drive = Class 2
- ZIP-250 drive = Class 4

**Table C-5** Attach Sequence Worksheet—Four Device Installation (Sample)

| Device Name              | Device Class | Position Number | Controller Name | Device Number |
|--------------------------|--------------|-----------------|-----------------|---------------|
| Ultra ATA-100 hard drive | 1            | ①               | Primary         | 0             |

**Table C-5** Attach Sequence Worksheet—Four Device Installation (Sample)

| Device Name               | Device Class | Position Number | Controller Name | Device Number |
|---------------------------|--------------|-----------------|-----------------|---------------|
| DVD-CDR/W drive           | 2            | ②               | Secondary       | 0             |
| ZIP-250 drive             | 4            | ③               | Secondary       | 1             |
| Ultra ATA-100 hard drive* | 1            | ④               | Primary         | 1             |

\*If there are three or more devices, two or more of which are hard drives, two hard drives should be attached to the primary controller first before following the General Attach Sequence Rule.

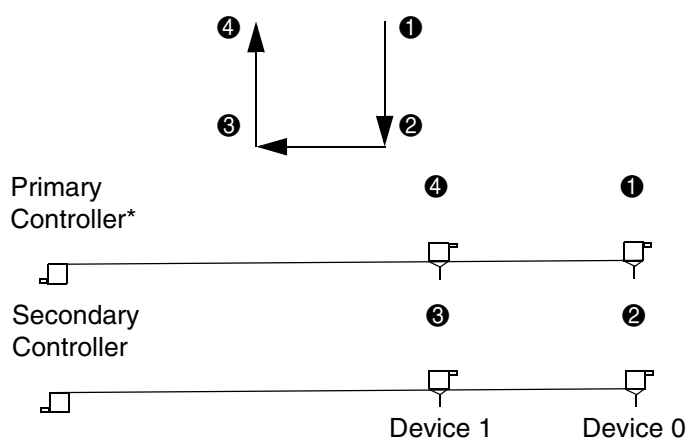


Figure C-3 Installing Drive Order (3)

## Additional Drive Application Notes

- When replacing a hard drive, the replacement should be of the same type (Ultra ATA-33, -66, or -100) as that being removed to retain the same level of performance.
- When Ultra ATA and SCSI hard drives are mixed in the same system, the Ultra ATA drive will become the boot drive unless the boot order is changed in Computer Setup (F10).

## SMART

The Self Monitoring Analysis and Recording Technology (SMART) ATA drives for HP workstations have built-in drive failure prediction that warns the user or network administrator of an impending failure or crash of the hard drive. The SMART drive tracks fault prediction and failure indication parameters, such as reallocated sector count, spin retry count, and calibration retry count. If the drive determines that a failure is imminent, it generates a fault alert.

# Jumpers

The following specification is are the standard drive configurations.

## CD-ROM or DVD-ROM Drive

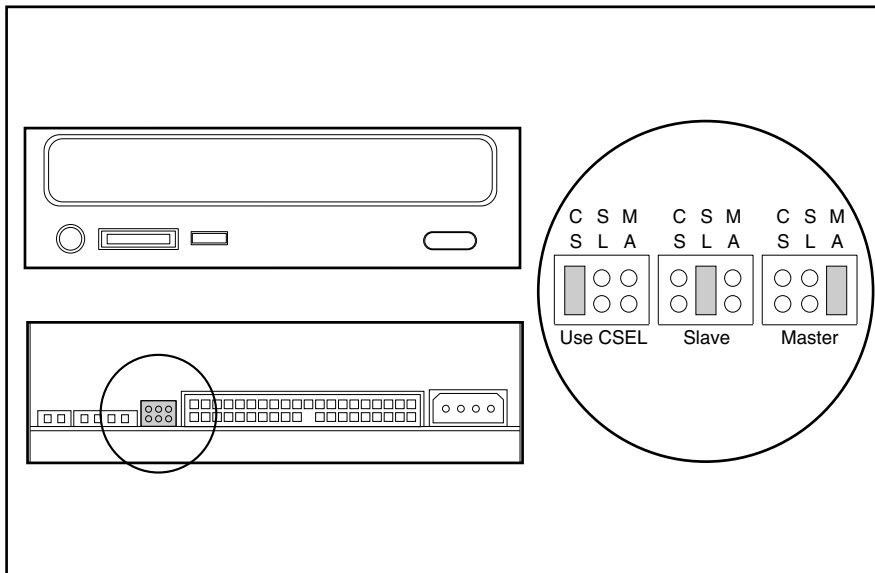


Figure C-4 CD-ROM or DVD-ROM drive jumpers